Gender Differences in Risk Factors for Stice's Bulimia in a Non-Clinical Sample

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Abstract

Some females are at an increased risk of developing bulimia. However, etiological factors and their interplay remain controversial. The present study analyzed Stice's Model for eating disorders in a non-clinical population by examining gender differences with respect to the following risk factors: body mass index (BMI), body dissatisfaction, perceived social pressure to be thin, body-thin internalization, and dieting behavior. A sample of 162 American college students (64 males and 91 females) was surveyed, and validated scales were used. The Stice's model was tested using Structural Equation Modeling. Our results supported Stice's Dual Pathway Model of bulimic pathology for females but not for males. The results of this study fail to support the role of BMI as a predictor of dietary restraint in females, the main risk factor of eating disorders. Males may abstain from dietary restraint to gain muscular volume and in turn increase their BMI. Implications are discussed.

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Eating disorders represent serious public mental health problems that are attracting increasing attention (Varsou, 2010). The prevalence of eating disorders can be underestimated when only individuals who seek treatment and meet the diagnostic criteria for anorexia nervosa (AN) and bulimia nervosa (BN) are considered (Faravelli et al., 2006; Stice, Marti, Shaw, and Jaconis, 2009). Therefore, models that explain partial symptoms, rather than models for complete AN or BN, as described in the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR), should be developed (American Psychiatric Association, 2000). A few models have been proposed to identify risk factors for and explain the development of eating disorders (Coller, 2004; Gleaves, Brown, & Warren, 2004; Kim, 2012). The two-pathway Stice model (Stice, 1994; Stice, 2001) is most likely one of the most comprehensive measures to explain the development of bulimic symptoms and integrates the following factors: 1) sociocultural pressure to be thin; 2) ideal-thin body internalization; 3) body dissatisfaction; 4) negative emotions; and 5) restrained eating (Figure 1). The dual pathway model refers to the negative emotions and restrained eating that represent the final predictors of bulimic symptoms (Stice, 2001; Stice, Bohon, Marti, and Fisher, 2008). According to this model, social pressure and thin body internalization promotes body dissatisfaction, which increases negative emotions and dieting behaviors that trigger bulimic pathology (Stice, 2001; Ouwens, van Strien, van Leeuwe & van der Staak, 2009). The model predicts that bulimic symptoms are associated with the social pressure to have a thin body leads to the internalization of the ideal of the thin body and therefore body dissatisfaction associated with negative emotions and restrained eating as a mean to reduce such discrepancy. Restrained eating and dieting behaviors, in particular, have drawn increased attention in the literature with respect to the development of clinical symptoms (for example, Stice, Pressnell, and Sprangler, 2002; Ouwens, van Strien, van Leeuwe, and van der Staak, 2009). Numerous studies have noted the core importance of eating restraint itself as a risk factor for the development and maintenance of eating disorders (Cogan and Ernsberger, 1999; Stice, Martinez, Presnell, and Groesz, 2006; Stice, Davis, Miller, and Marti, 2008; Andrés and Saldaña, 2014). Indeed, many symptoms of eating disorders are directly associated with dieting status as described in the “starvation study” by Keys (1950).

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[PLEASE, INSERT FIGURE 1 HERE]

The influence of the media and peers on the social pressure to be thin has been intensively studied. An extensive review of 25 studies analyzing the influence of the thin ideal model presented in mass media reveled a significant increase in body dissatisfaction after viewing thin media images rather than average or super-size models or non-human objects (Groesz, Levine and Murnen, 2002). Verbal peer pressure to be thin has also been reported in an experimental study in which 120 females exposed to so-called "fat talk" reported increased body dissatisfaction compared with a control group in which a neutral topic was discussed (Stice and Whitenton, 2002; Stice, Maxfield, and Wells, 2003). Similarly, exposure to negative information or feedback about body weight or appearance has been found to positively correlate with body dissatisfaction compared with exposure to control (non-appearance related) information (Lavin and Cash, 2001).

In sum, body dissatisfaction, which has been defined in various ways, is a key variable in Stice's model. Keeton, Cash and Brown (1990) defined body dissatisfaction as the discrepancy between the self body image and the ideal body image. Body dissatisfaction differs from body image distortion, which can be understood as the discrepancy between the self body image and the real body image. Cash, Edwin, and Deagle (1997) defined body dissatisfaction as a cognitive judgment bias rather than a perceptual distortion based on the overestimation of body size. Body dissatisfaction refers to the attitudinal dimension of the body image and body distortion to the perceptual dimension (Skrzypek, Wehmeier and Remschmidt, 2001).

The high prevalence of body dissatisfaction was first reported almost three decades ago and was referred to as "normative discontent" (Rodin, Silberstein and Striegel-Moore, 1985). A decade later, Brumberg (1997) reported that 13.53% of American girls were dissatisfied with their body at 13 years old; by age 17, the percentage had risen to 78%. In the United States, the ideal body is thin, as suggested by the trend in Playboy centerfolds models from 1959 to 1978, which exhibited significant decreases in bust and hip size (Garner, Garfinkel, Schwartz, and Thompson, 1980). Consequently, expenses related to the goals of weight loss and meeting the cultural standards of thinness and beauty in western society have increased. For example, the number of cosmetic procedures has tripled in the past decade according to the American Academy of Cosmetic Surgery (Shroff and Thompson, 2006). The drive for thinness is less pronounced in

males according to the trend reflected by male Hollywood stars, who are more muscular now than actors in the 1940s and 1950s (Goldfield, Blouin, and Woodside, 2006).

With respect to gender differences, literature has traditionally focused on females more than males (van Strien, 1996; Shepherd and Ricciardelli, 1998; Stice, 1998; Stice, 2001) because females exhibit higher body dissatisfaction than do males (Cohane and Pope, 2001; Brennan, Lalonde, and Bain, 2010; Zaccagni, Masotti, Donati, Mazzoni, and Gualdi-Russo, 2014). However, men are not free from body dissatisfaction. Three decades ago, Cash, Winstead and Jada (1986) found that the level of body dissatisfaction among men had increased since 1972; therefore, data must be continuously updated, and the male level of body dissatisfaction also should be analyzed in Stice's Model, which has been suggested to also be useful for males (Halliwell, and Harvey, 2006).

Gender differences have also been observed with respect to eating restraint or dieting behaviors, which are the best predictors of developing eating disorders, although negative emotion pathways also contribute (Van Strien, Engles, Van Leeuwe, and Snoek, 2005). Drewnowski and Yee (1987) reported that the percentage of women who followed a low-calorie diet in the previous month was more than double the number of males. Although women tend to diet to lose weight, men exercise to control weight and gain muscle.

Stice's model focuses on the development of bulimic symptoms, and such behaviors are also observed among the non-clinical population. However, the application of this model in the non-clinical population would benefit our current knowledge of the risk factors associated with eating disorders and would therefore benefit future programs for the prevention of eating disorders both in males and females.

The aim of this study was to explore and analyze gender differences in the selection of variables involved in Stice's Model of eating disorders in a non-clinical population.

The following hypotheses were addressed. Females will report higher body dissatisfaction (BSQ score) and dieting behaviors (DIS score). Females will perceive more social pressure to be thin (PSPS score) and will report higher thin-body internalization (IBSS score). Furthermore, differences in body dissatisfaction, dieting behavior and the perception of the pressure to be thin will be analyzed with respect to BMI levels. First, participants with higher BMIs will score higher with respect to body dissatisfaction

regardless of their gender and will report more weight loss behaviors, such as dieting (DIS score), and to perceive more pressure to be thin than those subjects with lower BMIs.

Materials and Methods

Participants

The sample included 162 college students, 41.4% males (n = 67) and 58.6% females (n = 95), recruited in a North American university. The study was conducted according to the guidelines established in the Declaration of Helsinki and approved by the local bioethics committee. All participants attended undergraduate psychology courses and had a mean age of 19.72 years (SD = 2.53). The mean age for males was 19.98 (SD = 2.72), and the mean age for females was 19.54 (SD = 2.39). No statistically significant differences were found between males and females. Participants were excluded from the study if any of the following criteria were met: 1) participants with a history of neurological or psychopathological disorders or current diagnoses of such; or 2) participants under current psychopharmacological treatment or with a history of psychopharmacological treatment.

Instruments

All participants filled out a 121-item questionnaire covering the following scales including age, gender, height and weight aimed to evaluate key variables of Stice's Model of eating disorders:

Body Mass Index (BMI): BMI was calculated from the self-reported weight and height using the following formula: weight (kg) / height $(m)^2$.

Body Shape Questionnaire (BSQ) (Cooper, Taylor, Cooper and Fairburn, 1987): The 34-item BSQ is a self-reported measure for body shape preoccupations typical of eating disorders. Participants answered questions like "*Has feeling bored made you brood about your shape?*" using a 6-point scale ranging from "*never, rarely, sometimes, often, very often or always"*. In items 12 and 25, the word "*women*" was replaced by "*person of your gender*".

Dietary Intent Scale (DIS) (Stice, 1998): This nine-item scale assessed weight control behaviors during the previous 6 months. For example, one sample item was "*I skip meals in an effort to control my weight*". Participants responded on a 6-item scale with responses ranging from "*never"* to "*always"*.

Perceived Sociocultural Pressure Scale (PSPS) (Stice and Bearman, 2001): Ten items assessed how much pressure participants felt to be thin from different sources. A sample item was "*I don't like looking at myself in mirrors*." Participants answered on a 5-point scale ranging from "*strongly disagree"* to "*strongly agree"*.

Ideal-Body Stereotype Scale- Revised (IBSS-R) (Stice and Agras, 1998): This six-item scale assessed how participants have internalized a thin ideal body image through their degree of agreement with statements regarding what defines physical attractiveness in women. A sample item was "*slender women are more attractive*." Participants answered on a 5-point scale ranging from "*strongly disagree" to "strongly agree"*.

Procedure

The participants were tested in gender-mixed groups ranging in size from 12 to 17 in a standard classroom over three weeks in October. Before the beginning of each session, complete instructions were written on a whiteboard at the front of the class. The surveys and the required consent forms were placed on each seat, and an empty desk was left between any two participants. On the consent form, the students were informed about the confidentiality and anonymity of all information gathered in the study.

Each survey consisted of eight pages. The first page contained the departmental instructions to participants for the survey studies. Students were asked not to discuss the project with anyone else until the end of the semester and to raise their hands if they had a question. The remaining pages contained the survey questions.

Data from one participant was discarded because the questionnaire was completed too quickly for adequate consideration of all of the items. Another participant was discarded because the participant responded "1" to all questions.

Data analysis

All statistics were calculated using SPSS v 21 AMOS for Windows (SPSS Inc., USA) with the level of significance set at $p < 0.05$.

First, a multivariable 2 x 2 ANOVA was conducted to study the gender differences among Stice's risk factor variables. The first factor was gender (males and females), and the second factor was the BMI level (low-BMI if BMI < 25 and high-BMI if BMI > 24.9), consistent with the classification used by the World

Health Organization (OMS) (http://www.euro.who.int/en/health-topics/disease-prevention/nutrition/a-healthy-lifestyle/body-mass-index-bmi) to differentiate normal BMI from overweight. We used the total scale scores of BSQ, DIS, PSPS and IBSS-R as the dependent variables.

Second, in order to assess the overall fit of the Stice's model to our data, a path analysis was performed for the variables taken into account for our study, using maximum likelihood estimation. In order to test for differences between men and women, the gender variable was used as the grouping variable for the analysis, thus allowing for the comparison between the coefficients assigned to each group.

RESULTS

Gender effect

Table 1 presents gender differences in the mean and standard deviation of each measurement.

Females scored significantly higher than males with respect to body dissatisfaction, as measured in BSQ scores ($F_{(1,151)} = 57.09$, $p < .05$). Females also scored higher in dieting as a weight loss measure compared with males. This difference in DIS scores was significant ($F_{(1,151)} = 26.35$, $p < .05$). Similarly, females scored higher than males with respect to perceived social pressure (PSPS scores). The ANOVA revealed significant gender differences ($F_{(1,151)} = 44.91$, $p < .05$). However, no significant gender differences were observed with respect to body thin internalization (IBSS-R score) when an ANOVA was conducted ($F_{(1,151)} = 0.0$, $p < .05$).

[PLEASE, INSERT TABLE 1 HERE]

BMI effect

Table 2 presents gender differences in variables for high or low BMI.

High BMI males and females reported higher body dissatisfaction (BSQ scores) than did low BMI males and females. An ANOVA revealed that there was a significant BMI effect $F_{(1,151)} = 21.65$, $p < .05$. In general, subjects with greater BMI perceived more social pressure to be thin compared with low BMI subjects. An ANOVA revealed that this difference was significant: $F_{(1,151)} = 15.08$, $p < .05$. No significant

differences were reported with respect to thin-body ideal internalization for subjects with low or high BMI: $F_{(1,151)} = 1.45$, $p > .05$.

[PLEASE, INSERT TABLE 2 HERE]

Interaction between gender and BMI

The mean BMI of the males was 25.65 (*SD* = 5.96), whereas the mean BMI of the females was 22.85 (*SD* = 4.95), representing a medium effect size with Cohen's $d^1 = 0.51$.

An interaction was observed among gender, BMI and dietary restraint. Only a few males reported dieting, and those with higher BMI values (X = 15.4, SD = 6.4) reported more weight loss-oriented behaviors (higher score on DIS) than did males with low BMI values (X = 12.2, SD = 5.2). However, females engaged in dieting behaviors independent of their BMI values. Both females with high (X = 20.7, SD = 7.0) and low BMI (X = 20.1, SD = 8.0) values reported weight loss behaviors (higher score on DIS): $F_{(1,151)} = 2.24$, $p > .05$. With respect to the social pressure to be thin, perceived social pressure from the media was significantly higher among females with high BMI values (X = 26.0, SD = 9.2) than among those with lower BMI values (X = 19.6, SD = 6.8) and higher than either high BMI (X = 16.3, SD = 5.7) or low BMI (X = 13.7, SD = 3.8) values ($F_{(1,151)} = 4.44$, $p < .05$).

Gender differences and Model fit by SEM

Model fit was satisfactory. Chi-square statistic was non-significant (CMIN = 11.023; d. f. = 6; n. s.; CMIN/DF = 1.837), and values for other fit indices were acceptable (GFI = .969; AGFI = .895; AIC = 39.023; RMSEA = .074). With respect to gender differences, all coefficients were similarly moderate and statistically significant for both men and women, with the exception of the regression weight of IBSS score on BSQ score, which was positive, and statistically significant for women ($r = .18$; $p < .05$), but close to zero and non-significant for men ($r = -.05$; n. s.), thus indicating a weak but significant effect of Ideal thin body internalization on Body dissatisfaction for women, but no effect at all for men. This makes squared multiple correlation for BSQ a bit larger for women ($R^2 = .37$) than for men ($R^2 = .32$), given that both PSPS and IBSS scores are significant predictors of BSQ for women, whereas PSPS is the only predictor of BSQ scores for men. Anyway, this difference disappears when examining the squared multiple correlation for

DIS, which is slightly larger for men (R^2 = .46) than for women (R^2 = .44) (Figure 2).

[PLEASE, INSERT FIGURE 2 HERE]

In summary, the path analysis results support the notion that the Stice's Dual Pathway model looks appropriate for women, but not for men, given that Ideal body internalization is not a significant factor in the development of body dissatisfaction for men. These results are consistent with the correlations obtained in Table 3, which show positive and significant correlations between IBSS and both BSQ (r = .334; p<.01) and DIS (r = .320; p<.01) scores for women, but not for men.

Discussion

The present study offers a detailed set of current data in a male and female sample of American college students that helps reveal the gender differences in the relationship between the main variables included in Stice's dual pathway model for overeating, which was developed more than a decade ago in a female high school population and did not include body mass index. Our results revealed that high body mass, internalized body thin ideal, and peer pressure are positively associated with body dissatisfaction, consistent with previous studies (Lawler and Nixon, 2011).

Our results support a higher level of body dissatisfaction in females than males. Specifically, our data resulted in a mean BSQ score of M = 91.95 and a standard deviation SD = 32.66 for a sample of 95 females. This level of body dissatisfaction is even higher than the level reported in the validation of BSQ in a British college female sample, with a mean BSQ score equal to 81.5 and a standard deviation of 28.4 (Cooper et al., 1987), and is higher than the body dissatisfaction reported in the Spanish adaptation of BSQ with adolescents 12 to 16 years old, with a mean BSQ score of 84.75 and a standard deviation of 30.42 (Raiche et al., 1996). These results support the assumption than body dissatisfaction is higher among females than males as well as a difference in direction of the dissatisfaction, with males reporting a desire to gain muscle whereas females wish to lose weight (Shaw, Stice, and Becker, 2009; Slevec and Tiggemann, 2011; Stice, Becker, and Yokum, 2013). As a consequence, prevention and treatment programs should address body dissatisfaction as a key element (Fairburn, Wilson, Agras, Welch, and Stice, 2004; Burton and

Stice, 2006; Stice and Presnell, 2007; Stice, Shaw, and Marti, 2007).

The relationship between BMI and body dissatisfaction has been controversial. BMI has been positively correlated with body dissatisfaction, and body dissatisfaction was been positively correlated with eating restraint in a Swedish sample of 260 eighth grade females and an Australian sample of 210 eighth grade females using questionnaires (Lunner et al., 2000). However, no association was found between BMI and body dissatisfaction in a sample of 516 participants ranging in age from 12 to 18 using questionnaires (Kostanski and Gullone, 1998). Our results suggest that BMI influences body dissatisfaction in females as well as in males (Shroff and Thompson, 2006; Mendes, Araújo, Lopes, and Ramos, 2014), consistent with recent findings in neuroimaging studies supporting the key role of high body mass as a risk factor for the development of eating disorders (Stice, Spoor, Bohon, Veldhuizen, and Small, 2008; Stice, Spoor, Ng, and Zald, 2009; Batterink, Yokum, and Stice, 2010; Stice, Yokum, Blum, and Bohon, 2010; Burger and Stice, 2011; Ng, Stice, Yokum, and Bohon, 2011; Stice, Yokum, Burger, Spstein, and Small, 2011; Yokum, Ng, and Stice, 2011; Burger and Stice, 2013). We detected a relationship between BMI and dietary restraint in men but failed to detect such a relationship between BMI and dietary restraint in women. This result is consistent with the larger pressure to be thin in women, prompting them to engage more easily in risk behaviors for eating disorders, such as dietary restraint.

Our results demonstrate that dieting is more prevalent among females than males. Indeed, the males' mean DIS score was close to the minimum possible score, which supports previously cited studies that concluded that men, even if dissatisfied, are more interested in gaining muscle and that college males generally do not use dieting as a means of weight control. For females, the results suggest a tendency to engage in weight loss behaviors when dissatisfied with their bodies, which may indicate vulnerability to the future development of eating disorders according to the literature (Presnell and Stice, 2003; Presnell, Stice, and Tristan, 2008; Stice and Fairburn, 2003; Stice, Davis, Miller, and Marti, 2008; Stice, Durant, Burger, and Schoeller, 2011). Consistently, the role of dieting restraint as a risk factor for the development of eating disorders has also receiving support from neuroimaging studies (Bohon, Stice, and Spoor, 2009; Stice, Yokum, Bohon, Marti, and Smolen, 2010; Burger and Stice, 2011; Stice, Burger, and Yokum, 2013).

For males, results fail to follow the same pattern, questioning the utility of Stice's Model for studying risk factors of eating disorders in males.

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In the present study, females reported perceiving greater pressure to be thin than did males, consistent with previous studies (Paxton, 1996; Stice, Maxfield, and Wells, 2003; Urquhart and Mihalynuk, 2011). The present study demonstrated that females and males exhibit the same degree of thinness internalization. In fact, both sexes reported a neutral attitude with respect to attractiveness and thinness; therefore, our results question the utility of this variable within the model.

Understanding eating disorder behavior is an important element to healthy behavior changes. Through building our understanding of the key variables that influence eating disorders, this study improves our ability to help the non-clinical population make healthier choices in preventing eating disorders using Stice's risk factors (Stice, Presnell, Groesz, and Shaw, 2005; Stice, Bohon, Marti, and Fisher, 2008).

To summarize, the present study partially support Stice's Dual Pathway Model for females but not for males. The data also indicated that the perceived social pressure to be thin came largely from the media, especially in high-BMI females. In addition, dietary restraint is independent of BMI in women. In women, body dissatisfaction is the best predictor of eating disorder risk behaviors such as dietary restraint, even if their current BMI falls within the normal range.

Further studies should compare this sample with samples from other groups, such as European college students, using the same questionnaires.

One of the possible limitations of the present study is that the subjects' attitudes toward their bodies were assumed to be stable across situations (i.e., testing room versus non-testing situations). However, Tiggemann (2000) found that body dissatisfaction can vary depending on the situation. Body-focused situations, such as the beach and other similar situations, resulted in higher dissatisfaction than did non–body-focused situations.

Despite the fact that the results of the present and other studies offer a global overview, a complete understanding of body dissatisfaction is still lacking, as indicated by Fernández-Aranda, Dahme, & Meerman (1999). Future studies should continue to contribute to the body of research on body dissatisfaction to improve our understanding of the relationships among dieting, body dissatisfaction, and associated variables. In addition, personality traits should be included in future studies.

This study aimed to identify risk factors and to contribute to the development of more efficient programs for the prevention of eating disorders (Bauer et al., 2013; Stice, Bytryn, Rohde, Shaw, and Marti,

2013) because eating disorders have been increasingly recognized as public heath priorities (Sánchez-Carracedo et al, 2013). However, unexpectedly, the results of this study fail to support the role of BMI as a predictor of dietary restraint in females, the main risk factor of eating disorders, which has been reported previously (Brunson, Overup, Nguyen, Novak and Smith, 2014). Males may abstain from dietary restraint to gain muscular volume and in turn increase their BMI.

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References

American Psychiatric Association. (2000). Diagnostic and statistical manual of mental disorders (4th ed., text rev.). doi:10.1176/appi.books.9780890423349.

Andrés, A. & Saldaña, C. (2014). Body dissatisfaction and dietary restraint influence binge eating behavior. *Nutrition Research*, 34(11), 944-950. doi: 10.1016/j.nutres.2014.09.003

Batterink, L., Yokim, S., & Stice, E. (2010). Body mass correlates inversely with inhibitory control in response to food among adolescent girls: an fMRI study. *Neuroimage, 52*, 1696-1703. doi: 10.1016/j.neuroimage.2010.05.059.

Bauer, S., Papezova, H., Chereches, R., Caselli, G., McLoughlin, O., Szumska, I....Moessner, M. (2013). Advances in the prevention and early intervention of eating disorders: The potential of Internet-delivered approaches. *Mental Health & Prevention, 1,* 16-32. doi: 10.1016/j.mhp.2013.10.003.

Bohon, C., Stice, E., & Spoor, S. (2009). Female emotional eaters show abnormalities in consummatory and anticipatory food reward: A functional magnetic resonance imaging study. *InternationalJournal of Eating Disorders, 42*, 210-221. doi: 10.1002/eat.20615.

Brennan, M. A., Lalonde C. E., & Bain J. L. (2010). Body image Perceptions: Do Gender Differences Exist? *Psi Chi Journal of Undergraduate Research, 15*(3), 1089-4136.

Brumberg, J. J. (1997). *The body project: An intimate history of American girls*. New York: Random House.

Brunson, J. A., Overup, C.S., Nguyen, M. L., Novak, S. A. and Smith, C. V. (2014). Good intentions gone awrey? Effects of weight-related social control on health and well being. *Body Image, 11*, 1-10. doi: 10.1016/j.bodyim.2013.08.003.

Burger, K. S., & Stice E. (2011). Relation of Dietary Restraint Scores to Activation of Reward-Related Brain Regions in Response to Food Intake, Anticipated Intake, and Food Pictures. *Neuroimage, 55*, 233-239. doi: 10.1016/j.neuroimage.2010.12.009.

Burger, K. S., & Stice, E. (2013). Elevated energy intake is correlated with hyperresponsivity in attentional, gustatory, and reward brain regions while anticipating palatable food receipt. The American *Journal of Clinical Nutrition, 97*(6), 1188-1194. doi: 10.3945/ajcn.112.055285.

Burton, E., & Stice, E. (2006). Evaluation of a healthy-weight treatment program for bulimia nervosa: A preliminary randomized trial. *Behaviour Research & Therapy, 44*, 1727-1738. doi: 10.1016/j.brat.2005.12.008.

Cash, T. F., Edwin A., & Deagle, E. A. (1997). The Nature and Extent of Body-Image Disturbances in Anorexia Nervosa and Bulimia Nervosa: A Meta-Analysis. *International Journal of Eating Disorders*, *22*(2), 107-125. doi: 10.1002/(SICI)1098-108X(199709)22:2<107::AID-EAT1>3.0.CO;2-J.

Cash, T. F., Winstead, B. A., & Janda, L. H. (1986). The great American shape-up; we're healthier than ever, fitter than ever … but less satisfied with how we look. *Psychology Today, 20*(4), 30-37.

Cogan, J. C., & Ernsberger, P. (1999). Dieting, weight, and health: Reconceptualizing research and policy. *Journal of Social Issues, 55*(2), 187-205. doi: 10.1111/0022-4537.00112.

Cohane, G. H., & Pope, H. G. (2001). Body image in boys: A review of the literature. *International Journal of Eating Disorders, 29(4*), 373-379. doi: 10.1002/eat.1033.

Coller, D. A. (2004). The etiology of eating disorders. *The British Journal of Psychiatry, 185*, 363-365. doi:10.1192/bjp.185.5.363.

Cooper, P. J., Taylor, M. J., Cooper, Z., & Fairburn, C. G. (1987). The development and validation of the Body Shape Questionnaire. *International Journal of Eating Disorders, 6*(4), 485-494. doi: 10.1002/1098-108X(198707)6:4<485.

Drewnowski, A., & Yee, D. K. (1987). Men and body image: are males satisfied with their body weight?. *Psychosomatic Medicine*, *49*(6), 626-634.

Fairburn, C. F., Wilson, G. T., Agras, W.S., Welch, T., & Stice, E. (2004). Early change in treatment predicts outcome in bulimia nervosa. *American Journal of Psychiatry, 161*, 2322-2324. doi: 10.1176/appi.ajp.161.12.2322.

Faravelli, C., Ravaldi, C., Truglia, E., Zucchi, T., Cosci, F., & Ricca, V. (2006). Clinical Epidemiology of Eating Disorders: Results from the Sesto Fiorentino Study. *Psychotherapy and Psychosomatics, 75*, 376-383. doi: 10.1159/000095444.

Fernández-Aranda, F., Dahme, B., & Meerman, R. (1999). Body image in eating disorders and analysis of its relevance: a preliminary study. *Journal of psychosomatic research*, *47*(5), 419-428. doi: 10.1016/S0022-3999(99)00027-6.

Garner, D. M., Garfinkel, P. E., Schwartz, D., & Thompson, M. (1980). Cultural expectations of thinness in women. *Psychological Reports, 47*, 483-491. doi: 10.1002/1098-108X(199201)11:1<85.

Gleaves, D. H., Brown, J. D., & Warren, C.S. (2004). The continuity/discontinuity models of eating disorders: a review of the literature and implications for assessment, treatment, and prevention. *Behavior Modification, 28*(6), 739-762. doi: 10.1177/0145445503259859.

Goldfield, G. S., Blouin, A. G., & Woodside, D. B. (2006). Body Image, Binge Eating, and Bulimia Nervosa in Male Bodybuilders. *Canadian Journal of Psychiatry*, *51*, 160-168.

Groesz, L. M., Levine, M. P., & Murnen, S.K. (2002). The effect of experimental presentation of thin media images on body satisfaction: A meta-analytic review. *International Journal of Eating Disorders, 31*(1), 1-16. doi: 10.1002/eat.10005.

Halliwell, E. & Harvey, M. (2006). Examination of a sociocultural model of disordered eating among male and female adolescents. *British Journal of Health Psychology*, *11*, 235-248. doi: 10.1348/135910705X39214.

Keeton, W. P., Cash, T. F., & Brown, T. A. (1990). Body image or body images? Comparative, multidimensional assessment among college students. *Journal of personality assessment. 54*(1-2), 213-230.

Keys, A. (1950). *The biology of human starvation*. Vol 1. Minneapolis, Minnesota: Univiersity of Minnesota Press.

Kim, S. F. (2012). Animal models of eating disordders. *Neuroscience, 211*, 2-12. doi: 10.1016/j.neuroscience.2012.03.024.

Kostanski, M., & Gullone, E. (1998). Adolescent body image dissatisfaction: Relationship with self esteem, anxiety, and depression controlling for body mass. *Journal of Child Psychology and Psychiatry, 39*, 255-262. doi: 10.1111/1469-7610.00319.

Lawler, M., & Nixon, E. (2011). Body dissatisfaction among adolescent boys and girls: the effects of body mass, peer appearance culture and internalization of appearance ideals. *Journal of Youth Adolescence, 40*(1), 59-71. doi: 10.1007/s10964-009-9500-2.

Lunner, K., Wertherm, E. H., Thompson, J. K., Paxton, S. J., McDonald, S. J., & Halvaarson, K. S. (2000). A cross-cultural examination of weight-related teasing, body image, and eating disturbance in Swedish

and Australian samples. *International Journal of Eating Disorders, 28*(4), 430-435. doi: 10.1002/1098-108X(200012)28:43.0.CO;2-Y.

McCabe, R. E., McFarlane, T., Polivy, J., & Olmsted, M. P. (2001). Eating disorders, dieting, and the accuracy of self-reported weight. *International Journal of Eating Disorders, 29(1),* 59-64. doi: 10.1002/1098-108X(200101)29:1<59::AID-EAT9>3.0.CO;2-#.

Mendes, V., Araújo, J., Lopes, C., and Ramos, E. (2014). Determinants of weight loss dieting among adolescents: A longitudinal analysis. *Journal of Adolescent Health, 54*(3), 360-363. doi: 10.1016/j.jadohealth.2013.12.003.

Ng, J., Stice, E., Yokum, S., & Bohon, C. (2011). An fMRI study of obesity, food reward, and perceived caloric density. Does a low-fat label make food less appealing? *Appetite, 57,* 65-72. doi: 10.1016/j.appet.2011.03.017.

Ouwens, M. A., van Strien, T., van Leeuwe, J. F. J., & van der Staak, C. P. F. (2009). The dual pathway model of overeating. Replication and extension with actual food consumption. *Appetite, 52*, 234-237. doi: 10.1016/j.appet.2008.07.010.

Paxton, S. (1996). Friendship, Body Image and Dieting in Teenage Girls: A Research Report. National Eating Disorder Information Centre. Retrieved October 12, 2006, from http://www.nedic.ca/knowthefacts/documents/Friendshipbodyimageanddietinginteenagegirls.pdf.

Presnell, K., & Stice, E. (2003). An experimental test of the effect of weight-loss dieting on bulimic pathology: Tipping the scales in a different direction. *Journal of Abnormal Psychology, 112*, 166-170. doi: 10.1037/0021-843X.112.1.166.

Presnell, K., Stice, E., & Tristan, J. (2008). An experimental investigation of the effects of naturalistic dieting on bulimic symptoms: Moderating effects of depressive symptoms. *Appetite, 50*, 91-101. doi: 10.1016/j.appet.2007.06.002.

Raech, R., Mora, M., Soler, A., Ávila, C., Clos, I., & Zapater, L. (1996). Adaptación de un instrumento de evaluación de la insatisfacción corporal. *Clínica y Salud, 7,* 51-66.

Rodin, J., Silberstein, L., & Striegel-Moore, R. (1985). Women and weight: A normative discontent. In T. T. Sonderegger (Ed.), *Psychology and gender: 1984 Nebraska Symposium Motivation* (267-308). Lincoln: University of Nebraska Press.

Sánchez-Carracedo, D., López-Guimerá, G., Fauquet, J., Barrada, J. R., Pámias, M., Puntí, J. … Trepat, E. (2013). A school-based program implemented by community providers previously trained for the prevention of eating and weight-related problems in secondary school adolescents: the MABOC study protocol. *BMC Public Health, 13,* 955. doi: 10.1186/1471-2458-13-955.

Shaw, H., Stice, E., & Becker, C. (2009). Preventing Eating Disorders. *Child and Adolescent Psychiatric Clinics of North America, 18,* 199-207. doi: 10.1016/j.chc.2008.07.012.

Shepherd, H., & Ricciardelli, L. A. (1998). Test of Stice´s dual pathway model: Dietary restraint and negative affect as mediators of bulimic behavior*. Behaviour Research and Therapy, 36*, 345-352.

Shroff, H., & Thompson, J. K. (2006). Peer Influences, Body-image Dissatisfaction, Eating Dysfunction and Self-esteem in Adolescent Girls. *Journal of Health Psychology*, *11*(4), 533-551. doi: 10.1177/1359105306065015.

Skrzypek, S. Wehmeier, P. M., & Remschmidt, H. (2001). Body image assessment using body size estimation in recent studies on anorexia nervosa. A brief review. *European Child & Adolescent Psychiatry*, *10*, 215-221. doi: 10.1007/s007870170010.

Slevec, J. H., & Tiggemann, M. (2011). Predictors of body dissatisfaction and disordered eating in middle-age women. *Clinical Psychology Review, 31*(4), 515-524. doi: 10.1016/j.cpr.2010.12.002.

Stice, E. (1994). A Review of the evidence for a sociocultural model of bulimia nervosa and a exploration of mechanisms of action. *Clinical Psychology Review, 14*, 633-661. doi:10.1016/0272-7358(94)90002-7.

Stice, E. (1998). Relations of restraint and negative affect to bulimic pathology: A longitudinal test of three competing models. *International Journal of Eating Disorders*, *23*, 242-260. doi: 10.1002/(SICI)1098-108X(199804)23:33.0.CO;2-J.

Stice, E. (2001). A prospective test of the dual-pathway model of bulimic pathology: Mediating effects of dieting and negative affect. *Journal of Abnormal Psychology, 110*, 124-135. doi: 10.1037//002l-843X.110.1,124.

Stice, E., & Agras, W. S. (1998). Prospective relation of dieting behaviors to weight change in a community sample of adolescents. *Behavior Therapy*, *29*, 277-276. doi: 10.1016/S0005-7894(98)80007-5.

Stice, E., & Bearman, S. K. (2001). Body image and eating disturbances prospectively predict increases in depressive symptoms in adolescent girls: A growth curve analysis. *Developmental Psychology, 37,* 597-607. doi: 10.1037//0012-1649.37.5.597.

Stice, E., Becker, C., & Yokum, S. (2013). Eating disorder prevention: current evidence-base and future directions. *The International Journal of Eating Disorders, 46*(5), 478-485. doi: 10.1002/eat.22105.

Stice, E., Bohon, C., & Marti, C. N., Fischer, K. (2008). Subtyping women with bulimia nervosa along dietary and negative affect dimensions: Further evidence of reliability and validity. *Journal of Consulting and Clinical Psychology, 76*, 1022-1033. doi: 10.1037/a0013887.

Stice, E., Burger, K., & Yokum, S. (2013). Caloric deprivation increases responsivity of attention and reward brain regions to intake, anticipated intake, and images of palatable foods. *Neuroimage, 67*, 322-330. doi: 10.1016/j.neuroimage.2012.11.028.

Stice, E., Bytryn, M. L., Rohde, P., Shaw, H., & Marti, C. N. (2013). An effectiveness trial of a new enhanced dissonance eating disorder prevention program among female college students. *Behavior Research and Therapy, 51*, 862-871. doi:10.1016/j.brat.2013.10.003.

Stice, E., Davis, K., Miller, N., & Marti, C. N. (2008). Fasting increases risk for onset of binge eating and bulimic pathology: A 5-year prospective study. *Journal of Abnormal Psychology, 117*, 941-946. doi: 10.1037/a0013644.

Stice, E., Durant, S., Burger, K., & Schoeller, D. (2011). Weight suppression and risk for future increases in body mass: Effects of suppressed resting metabolic rate and energy expenditure. *American Journal of Clinical Nutrition, 94,* 7-11. doi: 10.3945/ajcn.110.010025.

Stice, E., & Fairburn, C. G. (2003). Dietary and dietary-depressive subtypes of bulimia nervosa show differential symptom presentation, social impairment, comorbidity, and course of illness. *Journal of Consulting and Clinical Psychology, 71*, 1090-1094. doi: 10.1037/0022-006X.71.6.1090.

Stice, E., & Presnell, K. (2007). *The Body Project: Promoting Body Acceptance and Preventing Eating Disorders, Facilitators Guide*. New York: Oxford University Press.

Stice, E., Marti, C. N., Shaw, H., & Jaconis, M. (2009). An 8-year longitudinal study of the natural history of threshold, subthreshold, and partial eating disorders from a community sample of adolescents. *Journal of Abnormal Psychology, 118*, 587-597. doi: 10.1037/a0016481.

Stice, E., Martinez, E., Presnell, K., & Groesz, L. (2006). Relation of successful dietary restriction to bulimic pathology: A prospective community-based study. *Health* Psychology, 25, 274-281. doi: 10.1037/0278-6133.25.3.274.

Stice, E., Maxfield, J., & Wells, T. (2003). Adverse effects of social pressure to be thin on young women: An experimental investigation of the effects of "fat talk". *International Journal of Eating Disorders, 24*(1), 108-117. doi: 10.1002/eat.10171.

Stice, E., Presnell, K., Groesz, L., & Shaw, H. (2005). Effects of a weight maintenance diet on bulimic pathology: An experimental test of the dietary restraint theory. *Health Psychology, 24*, 402-412. doi: 10.1037/0278-6133.24.4.402.

Stice, E., Pressnell, K., & Sprangler, D. (2002). Risk factors for binge eating onset in adolescent girls: a 2-year prospective investigation. Health Psychology, 21, 131-138. doi: 10.1037/0278-6133.21.2.131.

Stice, E., Shaw, H., & Marti, C. N. (2007). A meta-analytic review of eating disorder prevention programs: Encouraging Findings. *Annual Review of Clinical Psychology, 3*, 233-257. doi: 10.1146/annurev.clinpsy.3.022806.091447.

Stice, E., Spoor, S., Bohon, C., Veldhuizen, M., & Small, D. (2008). Relation of reward from food intake and anticipated intake to obesity: A functional magnetic resonance imaging study. *Journal of Abnormal Psychology, 117*, 924-935. doi: 10.1037/a0013600.

Stice, E., Spoor, S., Ng, J., & Zald, D. (2009). Relation of obesity to consummatory and anticipatory food reward. *Physiology and Behavior. 97*(5), 551-60. doi: 10.1016/j.physbeh.2009.03.020.

Stice, E., & Whitenton, K. (2002). Risk factors for body dissatisfaction in adolescent girls: A longitudinal investigation. *Developmental Psychology, 38*, 669-678. doi: 10.1037/0012-1649.38.5.669.

Stice, E., Yokum, S., Blum, K., & Bohon, C. (2010). Weight gain associated with reduced striatal response to palatable food. *Journal of Neuroscience, 30*, 13105-13109. doi: 10.1523/JNEUROSCI.6604-10.2011.

Stice, E., Yokum, S., Bohon, C., Marti, N., & Smolen, A. (2010). Reward circuitry responsivity predicts future increases in body mass: Moderating effects of DRD2 and DRD4. *NeuroImage, 50*, 1618-1625. doi: 10.1016/j.neuroimage.2010.01.081.

Stice, E., Yokum, S., Burger, K., Epstein, L., & Small, D. (2011). Youth at risk for obesity show greater activation of striatal and somatosensory regions to food. *Journal of Neuroscience, 31*, 4360-4366. doi: 10.1523/JNEUROSCI.6604-10.2011.

Tiggemann, M. (2000). Dieting and cognitive style. The role of current and past dieting behaviour and cognitions. *Journal of Health Psychology, 5*(1), 17-24. doi: 10.1177/135910530000500106.

Urquhart, C. S., & Mihalynuk, T. V. (2011). Disordered eating in women: implications for the obesity pandemy. Canadian Journal of Dietetic Practice and Research, 72(1), 115-125. doi: 10.3148/72.1.2011.50.

Van Strien, T. (1996). On the relationship between dieting and "obese" and bulimic eating patterns. *International Journal of Eating Disorders, 19*(1), 83-92. doi: 10.1002/(SICI)1098-108X(199601)19:1<83::AID-EAT10>3.0.CO;2-R.

Van Strien, T., Engels, R. C., Van Leeuwe, J., Snoek, H. (2005). The Stice model of overeating: tests in clinical and non-clinical samples. *Appetite, 45*(3), 205-213. doi:10.1016/j.appet.2005.08.004.

Varsou, E. (2010). Eating disorders: A serious problem of mental health seeks solution. *Pschiatrike, 21*(3), 189-194.

Yokum, S., Ng, J., & Stice, E. (2011). Attentional bias for food images associated with elevated weight and future weight gain: An fMRI study. *Obesity, 19*, 1775-1783. doi: 10.1038/oby.2011.168.

Zaccagni, L., Masotti, S., Donati, R., Mazzoni, G., & Gualdi-Russo, E., (2014). Body image and weight perceptions in relation to actual measurements by means of a new index and level of physical activity in Italian university students. *Journal of Translational Medicine, 12*(42), 1-8. doi: 10.1186/1479-5876-12-42.

Figures and table captions

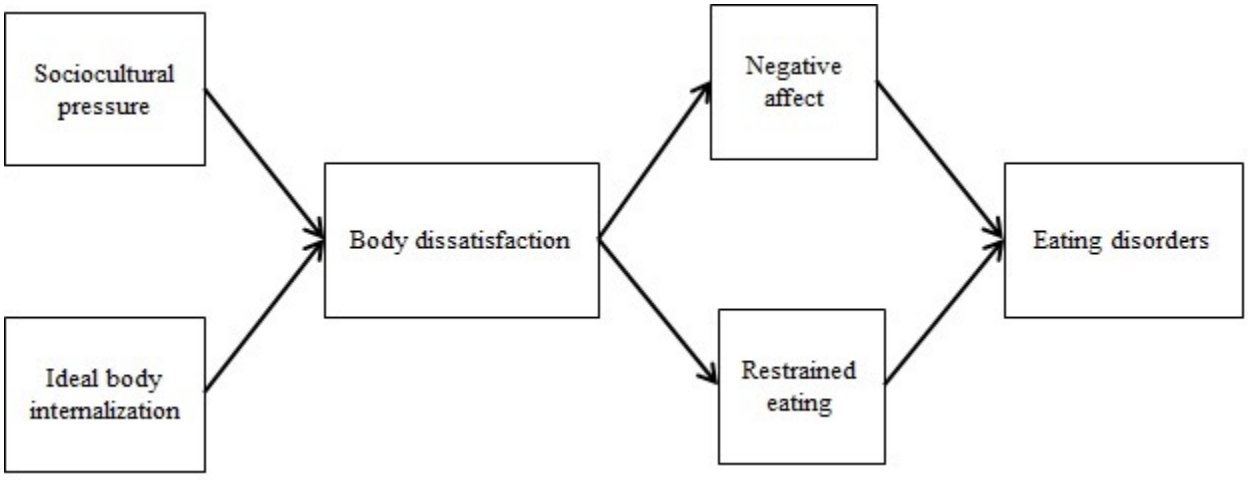

Figure 1: The two pathways in Stice's model.

Table 1: Gender differences in the means and standard deviations for every scale.

	Females (n = 95)	**Males (n = 67)**
	M (±SD)	**M (±SD)**
Body dissatisfaction (BSQ)	92.0 (±32.5)*	64.0 (±25.7)
Dieting (DIS)	20.2 (±7.8)*	13.6 (±5.9)
Perceived Social Pressure (PSPS)	20.2 (±7.8)*	13.6 (±5.9)
Thin Body Internalization (IBSS-R)	21.3 (±3.2)	21.4 (±3.3)

*: $p < 0.5$

Ruisoto, P, Cacho, R., López-Goñi, J.J., Real, E., Vaca, S. y Mayoral, P. (2015). Gender differences in Stice´s bulimia risk factors in a non-clinical sample. ***The Spanish Journal of Psychology,*** *18,* 1-10**.** http://dx.doi.org/10.1017/sjp.2015.58

Table 2: BMI differences in the means and standard deviations for every scale.

	Low-BMI (n = 102)	**High-BMI (n = 53)**
	M (±SD)	**M (±SD)**
Body dissatisfaction (BSQ)	73.88 (±28.88)	90.01 (±37.24)*
Dieting (DIS)	17.16 (±7.93)	18.05 (±7.53)
Perceived Social Pressure (PSPS)	17.31 (±6.36)	20.35 (±8.54)*
Thin Body Internalization (IBSS-R)	21.41 (±3.06)	21.17 (±3.57)

*: $p < 0.5$;

Figure 2. Path diagram for the variables of the Stice's model included in the study, with coefficients obtained for each gender (* = p<.05; ** = p<.001).